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of Transportation

**FEDERAL AVIATION
ADMINISTRATION**
Office of Aviation Policy and Plans

Washington, D.C. 20591

INITIAL REGULATORY IMPACT ANALYSIS, INITIAL REGULATORY FLEXIBILITY DETERMINATION, UNFUNDED MANDATES AND TRADE IMPACT ASSESSMENT

REDUCED VERTICAL SEPARATION MINIMUM OPERATIONS IN UNITED STATES DOMESTIC AIRSPACE (NPRM, 14 CFR PART 91)

**OFFICE OF AVIATION POLICY, PLANS, AND MANAGEMENT ANALYSIS
OPERATIONS REGULATORY ANALYSIS BRANCH**

APRIL 23, 2002

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Executive Summary

This Notice of Proposed Rulemaking (NPRM) proposes to establish airspace in the 48 contiguous States of the United States (U.S.), Alaska and that portion of the Gulf of Mexico where the FAA provides air traffic services, in which reduced vertical separation minimum (RVSM) operations may be conducted. The existing regulations are applicable to RVSM operations outside the U.S. RVSM was implemented in the North Atlantic (NAT) on March 27, 1997, Pacific (PAC) on February 24, 2000, and in the West Atlantic Route System (WATRS) on December 10, 2001. RVSM is under evaluation in this proposal for December 2004 implementation in airspace in the U.S. and Gulf of Mexico. This rulemaking action is intended to increase the number of available flight levels, enhance airspace capacity, permit operators to fly more fuel and time efficient tracks and altitudes, and enhance air traffic controller flexibility by increasing the number of available flight levels, while maintaining an equivalent level of safety.

The FAA estimates that this proposed rule would cost U.S. operators $634.0 million ($539.9 million discounted) for the fifteen-year time period 2002-2016. For the purposes of this cost analysis, the FAA has assumed that operators will choose to upgrade all of their aircraft to meet RVSM standards. Operators

of non-RVSM aircraft would, however, retain the option of flying above or below RVSM airspace. Benefits would begin accruing in December 2004. Estimated benefits, based on fuel savings for the commercial aircraft fleet over the years 2004 to 2018, would be $5.8 billion ($2.9 billion discounted). These benefits would be realized with no reduction in safety. This proposal would also require aircraft that are equipped with TCAS II and used in RVSM operations to incorporate TCAS II Version 7.0.

I. Introduction

This document contains a preliminary regulatory evaluation for an airspace rulemaking to reduce the vertical separation minimum from 2,000 feet to 1,000 feet for aircraft operating between FL 290 to FL 410 inclusive within airspace in the 48 contiguous States of the U.S., Alaska and the Gulf of Mexico. It also contains an initial regulatory flexibility determination, which is required by law, an international trade impact statement, which is required by the Office of Management and Budget (OMB), and an unfunded mandate assessment, which is required by law.

The FAA intends to add a new section to Part 91, similar to existing section 91.706, with the objective of making RVSM approvals and operation applicable to all operators conducting RVSM operations within airspace in the U.S. and Gulf of Mexico. These RVSM requirements include: meeting the specified altimetry system error, automatic altitude keeping system, and altitude alert system standards. These requirements must also be maintained for operations in the RVSM airspace. RVSM was successfully implemented in the NAT on March 27, 1997, PAC on February 24, 2000, and in WATRS RVSM on December 10, 2001.

II. History and Discussion of the Proposed Rule

The appropriate amount of vertical separation above Flight Level 290 has been a matter of discussion since the mid-1950's. Originally, the vertical separation standard was 1,000 feet at all altitudes, and high altitude flight was possible for only a small number of military aircraft. Advances in technology eventually gave transport and general aviation aircraft the ability to operate at higher altitudes, resulting in increased traffic along high altitude route structures. In the 1950's, a vertical separation minimum of 2,000 feet was established between aircraft operating above FL 290. As the number of aircraft capable of operating at higher altitudes increased, competition for the higher altitudes also increased. This competition for the higher altitudes, together with worldwide fuel shortages and increasing fuel prices, sparked an interest in the early 1970’s in implementing a reduced vertical separation minimum above FL 290. In 1973, the Air Transport Association (ATA) petitioned the Federal Aviation Administration (FAA) for a rule change to reduce the vertical separation minimum for aircraft operating above FL 290 to the original separation standard of 1,000 feet. The petition was denied in 1977 in part because (1) aircraft altimeters had not improved sufficiently, (2) improved maintenance and operational standards

had not been developed, and (3) altitude correction equipment was not available in all aircraft. In addition, the cost of re-equipping certain aircraft was significant. Based on all of the available information, the FAA decided that granting the petition at that time would adversely affect safety.

Improvements in altimetry system performance provided renewed impetus for the FAA to reduce the vertical separation standard above FL 290. Air data computers (ADC) provided an automatic means of correcting the known static source error, which resulted in improved aircraft altitude-measurement performance. Altimeters were improved with enhanced transducers and double aneroids for computing altitudes. In addition, the advent of transponded Mode C altitude allowed air traffic control (ATC) within secondary surveillance radar (SSR) coverage to monitor flight level.

In 1982, member States of the International Civil Aviation Organization (ICAO) Review of the General Concept of Separation Panel (RGCSP), including the United States, initiated programs to study the feasibility of safely reducing the vertical separation minimum at and above FL 290. These programs included: studies of precision radar data to analyze aircraft vertical performance, development of the performance requirements necessary for safe implementation of a 1,000-foot vertical separation minimum above FL 290, and a collision risk

analysis to evaluate the safety of future operations in a reduced separation environment. RVSM is a more stringent standard than current altitude-keeping standards.

In conclusion, these improvements provided renewed impetus to investigate reducing the vertical separation standard above FL 290.

This proposed rule would add a new section 91.180 and revise existing sections 91.159, 91.179 and part 91 Appendix G. These revisions would permit the reduction in the vertical separation minimum from 2,000 feet to 1,000 feet within airspace in the U.S. and Gulf of Mexico. The rule would also require the aircraft of operators flying between FL 290 and FL 410 to meet altimetry system error requirements, automatic altitude keeping requirements, and altitude alert system requirements to qualify for RVSM operations. There would be some minor economic impact on operators upgrading to TCAS II Version 7.0, which would require a software change in existing required TCAS II equipment. Most aircraft involved in oceanic operations are already equipped with TCAS II Version 7.0. However, 5,700 (5,100 general aviation and 600 commercial) aircraft in domestic operations are projected to require upgrading to TCAS II Version 7.0 at a cost of $8,000.00 per airframe, for a total estimated cost of $45.6 million.

III. Costs and Benefits

The analysis described in this regulatory evaluation is based on the following assumptions:

- All costs and benefits are presented in 2001 dollars.
- Projections of current air carrier and general aviation fleets are current as of 2001.
- All aircraft will upgrade for RVSM.
- A discount rate of 7 percent is applied.
- Benefits of RVSM implementation would begin to accrue in 2004.
- Aircraft operator and ATC costs would begin to accrue in January 2002.
- The implementation plan is to implement RVSM for FL's 290-410 in December 2004.

Based on analysis updated and adopted by the FAA, this proposed rule would cost U.S. operators $634.0 million for the fifteen-year time period 2002-2016, or $539.9 million, discounted[1]. However, operators of non-RVSM aircraft would still be able to fly above or beneath RVSM airspace. The potential quantifiable benefits are based on fuel savings for the commercial aircraft fleet. The benefits would begin accruing in

[1] CSSI, Inc.

2004. The fuel savings are estimated at $5.8 billion ($2.9 billion, discounted) over the years 2004 to 2018. This rulemaking would not adversely impact safety.

A. Costs

The cost of the following elements of RVSM implementation will be considered:

- Aircraft Airworthiness Approval
- TCAS II Version 7.0 software upgrade costs
- Monitoring
- ATC
- Operator Training

1. Aircraft Airworthiness Approval Costs

Under the proposed rule, U.S. Domestic operators seeking RVSM approval would be required to ensure that their aircraft meet various equipment and altimetry system requirements. These standards are contained in part 91 Appendix G. Aircraft engineering packages have been developed for each specific aircraft type. The estimated costs associated with these requirements are grouped by aircraft type for both commercial and general aviation aircraft (See Table 1).

Table 1: Commercial Aircraft Engineering Costs		
Type	Estimate	Source
A300	****	Manufacturer (Visual inspection only)
A320	****	Manufacturer (Visual inspection only)
A330	****	Manufacturer (Visual inspection only)
A340	****	Manufacturer (Visual inspection only)
B721,B722	$175,000.00	Engineering design organization
B731	$187,500.00	
B732	$55,000.00	Operator Survey 2/01
B733-B735	$17,500.00	Operator Survey 1/01
B736-B739	****	Manufacturer (Visual inspection only)
B741,B742,B743	$58,400.00	FAA Survey 12/97 and OWG Survey 6/97
B744	$33,300.00	OWG Survey 6/97
B752,B753	$50,700.00	FAA Survey 12/97 and OWG Survey 6/97
B762,B763,B764	****	Manufacturer (Visual inspection only)
B772, B773	****	Manufacturer (Visual inspection only)
F100	$8,000.00	Operator Survey 6/01
DC8	$187,500.00	Engineering design organization
DC9	$187,500.00	Engineering design organization
DC10	$2,200.00	OWG Survey 6/97
MD11	$2,200.00	Engineering analysis, similar to DC10
MD80	$33,300.00	Engineering analysis, similar to B744
MD90	$33,300.00	Engineering analysis, similar to B744
L101	$25,000.00	Manufacturer, 1/01
BE40	$18,000.00	Manufacturer
CL60 (1A)	$62,500.00	Manufacturer
CL60 (3A/3R)	$17,500.00	Manufacturer
CL60 (604)	****	Manufacturer
CRJ1		
CRJ2		
CRJ7		
GLEX	****	Manufacturer
C525	$50,000.00	Manufacturer, 3/01
C525A	$22,600.00	Manufacturer, 3/01
C550	****	Manufacturer, 3/01
C560	****	Manufacturer, 3/01
C56X	****	Manufacturer, 3/01
C650	$29,100.00	Manufacturer, 3/01
C750	****	Manufacturer, 3/01
E135	$17,500.00	Manufacturer
E145	$17,500.00	Manufacturer
F2TH	$15,000.00	Manufacturer

Table 1: Commercial Aircraft Engineering Costs		
F900	$15,000.00	Manufacturer
FA50	$15,000.00	Manufacturer
FA20	$15,000.00	Manufacturer
GLF2	$235,000.00	Manufacturer
GLF3 (S/N 426 and lower)	$226,200.00	Manufacturer
GLF3 (S/N 427 and higher)	$14,000.00	Manufacturer
GLF4	$14,000.00	Manufacturer
GLF5	****	Manufacturer
H25B	$32,500.00	Manufacturer
H25C	$32,500.00	Manufacturer
LJ31	$46,000.00	Manufacturer
LJ35	$145,000.00	Manufacturer
LJ45	****	Manufacturer
LJ55	$155,000.00	Manufacturer
LJ60	$13,500.00	Manufacturer

****** Costs anticipated to be less than $100 per aircraft**

These estimates represent the cost of the engineering work associated with making an aircraft RVSM compliant or the airworthiness approval cost. An additional cost consideration involves aircraft equipped with TCAS Version 6.04 upgrading to TCAS II Version 7. The FAA estimates this cost to be $8000.00 per aircraft. The FAA estimates that 5,100 general aviation and 600 commercial aircraft would need to upgrade for a total estimated cost of $45.6 million. The FAA published Airworthiness Directives in 1994 that required TCAS II units to be upgraded to Version 6.04. The FAA assumes that all aircraft equipped with TCAS II have upgraded to Version 6.04a. The FAA requests comments on this assumption. Although Part 91 operators are not required to be TCAS equipped, a majority of

these aircraft have TCAS and this cost estimate presents a worst-case scenario.

In order to determine the operators within the airspace of the U.S. and Gulf of Mexico and the type of aircraft they fly, a sample of Enhanced Traffic Management System (ETMS) data was studied. The traffic sample consisted of 6 days of data from July 2000. The ETMS data is comprised of actual aircraft traffic data that identifies operators, aircraft types, and the frequency of operations. For the U.S. commercial carriers, U.S. domestic operator and aircraft type information from ETMS data was combined with projected aircraft fleet data obtained from an FAA U.S. Domestic Operator Survey of operators generating over 80% of U.S. domestic traffic.[2] Operator fleet data was then queried against approved aircraft data from the NAT Central Monitoring Agency (CMA) and the Asia/Pacific Approvals Registry and Monitoring Organization (APARMO). The results of this analysis provide the number of aircraft by type that would need to be airworthiness approved or upgraded for RVSM for each US Domestic operator (See Table 2).

[2] FAA U.S. Domestic Operator Survey conducted by CSSI, Inc. May, 2001.

Table 2. Commercial Aircraft Upgrade Costs							
Airline/Operator	AC Type	Total Fleet Size	Future Ops. In RVSM	RVSM Approved	To Upgrade	$ per A/C	Total
Air Tran	B712	50	50	0	50	****	$0.00
	B732	4	4	0	4	$55,000.00	$220,000.00
	DC9	34	34	0	34	$187,500.00	$6,375,000.00
Air Transport International	DC8	26	26	0	26	$187,500.00	$4,875,000.00
Air Wisconsin	CRJ2	9	9	0	9	$15,000.00	$135,000.00
Airborne Express	B762	28	28	0	28	****	$0.00
	DC8	35	27	0	27	$187,500.00	$5,062,500.00
	DC9	74	74	0	74	$187,500.00	$13,875,000.00
Alaska Airlines	B732	8	8	0	8	$55,000.00	$440,000.00
	B734	40	40	0	40	$17,500.00	$700,000.00
	B737	18	18	0	18	****	$0.00
	B739	11	11	0	11	****	$0.00
	MD80	34	34	0	34	$33,300.00	$1,132,200.00
Allegiant Air, Inc.	DC9	4	4	0	4	$187,500.00	$750,000.00
Aloha Airlines	B737	2	2	2	0	****	$0.00
	B732	19	19	3	16	$55,000.00	$880,000.00
America West	A320	11	11	0	11	****	$0.00
	B732	14	0	0	0	$55,000.00	$0.00
	B733	47	47	0	47	$17,500.00	$822,500.00
	B752	13	13	0	13	$50,700.00	$659,100.00
American Airlines	A300	35	35	10	25	****	$0.00
	B722	63	0	0	0	$175,000.00	$0.00
	B738	48	113	0	113	****	$0.00
	B752	102	123	11	112	$50,700.00	$5,678,400.00
	B762	30	30	22	8	****	$0.00
	B763	49	49	49	0	****	$0.00
	B772	39	45	9	36	****	$0.00
	DC10	8	0	10	0	$2,200.00	$0.00
	F100	75	75	0	75	$8,000.00	$600,000.00
	MD11	8	0	21	0	$2,200.00	$0.00
	MD80	276	264	0	264	$33,300.00	$8,791,200.00

Table 2. Commercial Aircraft Upgrade Costs							
	MD90	5	0	0	0	$33,300.00	$0.00
American Eagle	CRJ7	0	25	0	25	$15,000.00	$375,000.00
	E135	40	40	0	40	$17,500.00	$700,000.00
	E140	0	137	0	137	$17,500.00	$2,397,500.00
	E145	56	56	0	56	$17,500.00	$980,000.00
American Trans Air	B722	24	0	0	0	$175,000.00	$0.00
	B738	0	39	0	39	****	$0.00
	B752	15	14	16	0	$50,700.00	$0.00
	B753	0	10	0	10	$50,700.00	$507,000.00
	L101	16	5	17	0	$25,000.00	$0.00
Amerijet International	B722	12	12	0	12	$175,000.00	$2,100,000.00
Arrow Airways, Inc.	L101	3	3	0	3	$25,000.00	$75,000.00
	DC8	11	11	0	11	$187,500.00	$2,062,500.00
Atlantic Coast	CRJ2	46	112	0	112	$15,000.00	$1,680,000.00
	J328	0	60	0	60	****	$0.00
Atlantic Southeast	CRJ2	46	100	0	100	$15,000.00	$1,500,000.00
Atlas Air, Inc.	B744	12	12	12	0	$33,300.00	$0.00
	B743	3	3	2	1	$58,400.00	$58,400.00
	B742	23	23	23	0	$58,400.00	$0.00
Britt Airways (Continental Express)	E145	150	375	0	375	$17,500.00	$6,562,500.00
Capital Cargo International Airlines	B722	12	12	0	12	$175,000.00	$2,100,000.00
Casino Express Airlines	B732	5	5	0	5	$55,000.00	$275,000.00
Challenge Air Cargo, Inc.	DC10	3	3	0	3	$2,200.00	$6,600.00
Champion Air	B722	12	12	0	12	$175,000.00	$2,100,000.00
Chautauqua Airlines	E145	25	25	0	25	$17,500.00	$437,500.00
Comair	CRJ1	110	110	0	110	$15,000.00	$1,650,000.00
	CRJ7	20	20	0	20	$15,000.00	$300,000.00
Continental	B735	131	131	0	131	$17,500.00	$2,292,500.00
	B737	89	133	34	99	****	$0.00
	B752	40	40	41	0	$50,700.00	$0.00
	B762	1	10	3	5	****	$0.00
	B764	2	24	3	21	****	$0.00
	B772	16	18	16	2	****	$0.00

Table 2. Commercial Aircraft Upgrade Costs							
	DC10	23	0	36	0	$2,200.00	$0.00
	MD80	66	66	0	66	$33,300.00	$2,197,800.00
Custom Air Transport, Inc.	B722	4	4	0	4	$175,000.00	$700,000.00
Delta Airlines	B722	85	0	0	0	$175,000.00	$0.00
	B732	54	54	0	54	$55,000.00	$2,970,000.00
	B733	26	26	0	26	$17,500.00	$455,000.00
	B738	35	132	0	132	****	$0.00
	B752	113	121	0	121	$50,700.00	$6,134,700.00
	B762	15	15	0	15	****	$0.00
	B763	86	87	42	45	****	$0.00
	B764	11	21	0	21	****	$0.00
	B772	7	13	2	11	****	$0.00
	L101	17	0	5	0	$25,000.00	$0.00
	MD11	15	15	15	0	$2,200.00	$0.00
	MD80	120	120	0	120	$33,300.00	$3,996,000.00
	MD90	16	16	0	16	$33,300.00	$532,800.00
DHL	A300	6	6	0	6	****	$0.00
	B721	10	0	0	0	****	$0.00
	B722	10	12	0	12	$175,000.00	$2,100,000.00
	DC8	7	7	0	7	$187,500.00	$1,312,500.00
Emery Worldwide	DC10	8	8	0	8	$2,200.00	$17,600.00
	DC8	28	13	0	13	$187,500.00	$2,437,500.00
Evergreen International Airlines	B74R	2	2	2	0	****	$0.00
	B742	4	4	4	0	$58,400.00	$0.00
	B741	6	6	5	1	$58,400.00	$58,400.00
	DC9	7	7	0	7	$187,500.00	$1,312,500.00
Express One International, Inc.	B722	29	29	0	29	$175,000.00	$5,075,000.00
Falcon Air Express	B722	4	4	0	4	$175,000.00	$700,000.00
Federal Express	A310	77	77	1	76	****	$0.00
	B721	2	2	0	2	$175,000.00	$350,000.00
	B722	159	159	0	159	$175,000.00	$27,825,000.00
	DC10	94	94	22	72	$2,200.00	$158,400.00
	MD11	58	58	25	33	$2,200.00	$72,600.00

Table 2. Commercial Aircraft Upgrade Costs							
Fine Airlines, Inc.	L101	1	1	0	1	$25,000.00	$25,000.00
	DC8	12	12	0	12	$187,500.00	$2,250,000.00
Florida West Airlines	DC8	2	2	0	2	$187,500.00	$375,000.00
Frontier Airlines	A320	1	25	0	25	****	$0.00
	B732	7	0	0	0	$55,000.00	$0.00
	B733	18	0	0	0	$17,500.00	$0.00
Gemini Air Cargo, LLC	MD11	3	3	3	0	$2,200.00	$0.00
	DC10	12	12	10	2	$2,200.00	$4,400.00
Gulf Air, Inc.	B722	6	6	0	6	$175,000.00	$1,050,000.00
Hawaiian Airlines	DC10	15	15	14	1	$2,200.00	$2,200.00
Horizon Air	CRJ7	30	30	0	30	$15,000.00	$450,000.00
	F100	21	0	0	0	$8,000.00	$0.00
Iowair	B732	2	2	0	2	$55,000.00	$110,000.00
Jetblue Airways Corp.	A320	40	40	0	40	****	$0.00
Kitty Hawk	B722	31	36	0	36	$175,000.00	$6,300,000.00
LB Limited	B722	2	2	0	2	$175,000.00	$350,000.00
Legend Airlines, Inc.	DC9	7	7	0	7	$187,500.00	$1,312,500.00
Mesa Airlines	CRJ2	32	32	0	32	$15,000.00	$480,000.00
	E145	36	36	0	36	$17,500.00	$630,000.00
Miami Air International, Inc.	B722	8	8	0	8	$175,000.00	$1,400,000.00
Midway Airlines	B737	11	11	0	11	****	$0.00
	CRJ	24	24	0	24	$15,000.00	$360,000.00
	F28	4	4	0	4	$8,000.00	$32,000.00
Midwest Express	DC9	24	16	0	16	$187,500.00	$3,000,000.00
	MD80	12	12	0	12	$33,300.00	$399,600.00
North American Airlines, Inc.	B738	2	2	0	2	****	$0.00
	B752	3	3	3	0	$50,700.00	$0.00
Northern Air Cargo, Inc.	B722	2	2	0	2	$175,000.00	$350,000.00
Northwest Airlines	A320	70	92	0	92	****	$0.00
	A330	0	22	0	22	****	$0.00
	B722	30	0	0	0	$175,000.00	$0.00
	B744	47	50	47	3	$33,300.00	$99,900.00
	B752	48	73	0	73	$50,700.00	$3,701,100.00

Table 2. Commercial Aircraft Upgrade Costs							
	DC10	45	13	44	0	$2,200.00	$0.00
	DC9	172	156	0	156	$187,500.00	$29,250,000.00
Omni Air Express, Inc.	DC10	4	4	3	1	$2,200.00	$2,200.00
Pan American Airways Corp.	B722	7	7	0	7	$175,000.00	$1,225,000.00
Polar Air Cargo, Inc.	B742	8	8	8	0	$58,400.00	$0.00
	B744	3	3	3	0	$33,300.00	$0.00
	B741	12	12	10	2	$58,400.00	$116,800.00
Pro Air, Inc.	B734	3	3	0	3	$17,500.00	$52,500.00
Reliant Airlines, Inc.	DC9Q	3	3	0	3	$187,500.00	$562,500.00
Ross Aviation, Inc.	DC9	2	2	0	2	$187,500.00	$375,000.00
Ryan International	B721	22	5	0	5	$175,000.00	$875,000.00
	B722	14	13	0	13	$175,000.00	$2,275,000.00
	B732	2	2	0	2	$55,000.00	$110,000.00
	B734	1	3	0	3	$17,500.00	$52,500.00
	DC10	2	2	4	0	$2,200.00	$0.00
Sierra Pacific Airlines	B732	2	2	0	2	$55,000.00	$110,000.00
Skywest	CRJ1	11	11	0	11	$15,000.00	$165,000.00
	CRJ2	55	55	0	55	$15,000.00	$825,000.00
Southeast Airlines, Inc.	DC9	2	2	0	2	$187,500.00	$375,000.00
Southern Air, Inc.	B742	3	3	3	0	$58,400.00	$0.00
Southwest	B732	33	0	0	0	$55,000.00	$0.00
	B733	194	194	0	194	$17,500.00	$3,395,000.00
	B735	25	25	0	25	$17,500.00	$437,500.00
	B737	92	150	0	150	****	$0.00
Spirit Airlines	DC9	8	8	0	8	$187,500.00	$1,500,000.00
	MD80	16	16	0	16	$33,300.00	$532,800.00
Sun Country	B722	12	12	0	12	$175,000.00	$2,100,000.00
	B738	6	6	0	6	****	$0.00
	DC10	4	4	2	2	$2,200.00	$4,400.00
Sunworld International Airways, Inc.	B722	2	2	0	2	$175,000.00	$350,000.00
Tradewinds International Airlines	A30B	5	5	0	5	****	$0.00
	L101	5	5	1	4	$25,000.00	$100,000.00
Trans World Express	E145	15	15	0	15	$17,500.00	$262,500.00

Table 2. Commercial Aircraft Upgrade Costs							
Transmeridian Airlines	B722	2	2	0	2	$175,000.00	$350,000.00
	A320	3	3	2	1	****	$0.00
TWA	A320	0	50	0	50	****	$0.00
	B712	15	50	0	50	****	$0.00
	B752	26	36	26	10	$50,700.00	$507,000.00
	B762	16	16	12	4	****	$0.00
	DC9	35	0	0	0	$187,500.00	$0.00
	MD80	100	68	0	68	$33,300.00	$2,264,400.00
United Airlines	A320	100	133	0	133	****	$0.00
	B722	75	0	0	0	$175,000.00	$0.00
	B732	24	0	0	0	$55,000.00	$0.00
	B735	158	158	0	158	$17,500.00	$2,765,000.00
	B742	6	0	14	0	$58,400.00	$0.00
	B744	44	44	41	3	$33,300.00	$99,900.00
	B752	99	99	32	67	$50,700.00	$3,396,900.00
	B762	19	19	8	11	****	$0.00
	B763	50	50	32	18	****	$0.00
	B772	46	56	42	14	****	$0.00
	DC10	10	0	20	0	$2,200.00	$0.00
UPS	A300	30	30	0	30	****	$0.00
	B721	8	8	0	8	$175,000.00	$1,400,000.00
	B722	51	51	0	51	$175,000.00	$8,925,000.00
	B741	11	11	11	0	$58,400.00	$0.00
	B742	5	5	4	1	$58,400.00	$58,400.00
	B752	75	75	6	69	$50,700.00	$3,498,300.00
	B763	30	30	22	8	****	$0.00
	DC8	49	49	0	49	$187,500.00	$9,187,500.00
USA Jet Airlines, Inc.	DC9	13	13	0	13	$187,500.00	$2,437,500.00
USAirways	A320	113	113	0	113	****	$0.00
	A330	9	9	4	5	****	$0.00
	B732	44	44	0	44	$55,000.00	$2,420,000.00
	B733	85	85	0	85	$17,500.00	$1,487,500.00
	B734	54	54	0	54	$17,500.00	$945,000.00

Table 2. Commercial Aircraft Upgrade Costs							
	B752	34	34	0	34	$50,700.00	$1,723,800.00
	B762	11	11	12	0	****	$0.00
	DC9	7	0	0	0	$187,500.00	$0.00
	F100	40	40	0	40	$8,000.00	$320,000.00
	MD80	31	0	0	0	$33,300.00	$0.00
Vanguard Airlines	B732	14	14	0	14	$55,000.00	$770,000.00
World Airways, Inc.	DC10	5	5	4	1	$2,200.00	$2,200.00
	MD11	9	9	9	0	$2,200.00	$0.00
		6255	6756	919	5990		$247,855,000.00

As previously mentioned, many general aviation operators have been approved for RVSM operations on the basis of actual or potential flights. As of June 4, 2001, approximately 1,500 general aviation aircraft were airworthiness approved for RVSM. (See Table 3).

Table 3. General Aviation Aircraft Engineering Costs

A/C	US Registered	RVSM Approved	To Upgrade	Cost per A/C	Total
BE40	263	1	262	$18,000	$4,716,000
CL60	522	281	241	$24,300	$5,856,300
GLEX	20		20	****	$0
LJ20	452		452	$225,000	$101,700,000
LJ31	192		192	$46,000	$8,832,000
LJ35/36	738		738	$145,000	$107,010,000
LJ45	140	3	137	****	$0
LJ55	140		140	$155,000	$21,700,000
LJ60	176	45	131	$13,500	$1,768,500
ASTR	93	17	76	$45,000	$3,420,000
GALX	14	5	9	****	$0
F2TH	99	78	21	$15,000	$315,000
F900	161	137	24	$15,000	$360,000
FA50	205	148	57	$15,000	$855,000
FA20	29	21	8	$15,000	$120,000
GULF G5	93	69	24	****	$0
GULF G4	456	301	155	$14,000	$2,170,000
GULF G3*	38	38	0	$14,000	$0
GULF G3**	83	54	29	$226,200	$6,559,800
GULF G2	183	17	166	$235,000	$39,010,000
H25B	486	115	371	$32,500	$12,057,500
H25C	28	13	15	$32,500	$487,500
C525	299	6	293	$22,600	$6,621,800
C550	515	7	508	****	$0
C560	424	6	418	****	$0
C56X	61	16	45	****	$0
C650	254	17	237	$29,100	$6,896,700
C750	122	92	30	****	$0
TOTAL	6,286	1,487	4,799		$330,456,100

* SERIAL # 427 AND HIGHER

** SERIAL # 426 AND LOWER

**** Costs Anticipated To Be Less Than $100 Per Aircraft

The FAA expects that general aviation aircraft will start seeking approval for RVSM operations in 2002. These general aviation operators would seek approval in order to have the flexibility to operate in any airspace, including airspace where RVSM would be applied. In order to account for those aircraft seeking approval for RVSM operations, the FAA assumed that operators having RVSM-capable aircraft would upgrade to enjoy the benefits of RVSM.

2. Maintenance Costs

Aircraft altimetry systems, auto-pilots and altitude alerters are already maintained under existing maintenance programs. RVSM programs do not impose significant additional maintenance tasks for these systems for the fleet of aircraft operating above FL 290. For the purposes of this analysis, maintenance and maintenance training costs were not considered significant. The FAA invites comments on this assumption.

3. Pilot Training Costs

Operational program requirements include flight crew training to ensure familiarity with RVSM operations. Most operators provide RVSM information to pilots by distributing a pilot bulletin containing policies/procedures unique to RVSM operations. The cost of compliance with the bulletin is

estimated to be $500.00 for each operator or $2.4 million for 47 commercial and 4,799 general aviation operators.

4. Monitoring Costs

Monitoring is a quality control process that enables authorities to assess the actual in-service altitude-keeping performance of individual airframes, individual aircraft groups and the aircraft population as a whole. Its major objectives are to ensure that RVSM standards and practices are applied in a uniform manner and to identify and resolve potential adverse trends in RVSM operations. A central monitoring agency (CMA) would be required to oversee the ground-based monitoring units and global positioning system (GPS)-based monitoring system (GMS) and determine the overall height-keeping performance of aircraft operating in U.S. Domestic Airspace. The North American Approvals and Registry Monitoring Organization (NAARMO) managed by FAA ACT-520 would serve as the U.S. Domestic RVSM CMA. The NAARMO would be responsible for coordinating with local FSDO offices and ICAO member states and tracking the overall performance of monitoring.

The FAA will deploy three ground-based monitoring units underlying the most frequently over flown areas in U.S. Domestic Airspace. The ground-based units will provide operators a cost-free method to meet their monitoring goals. An alternative

monitoring choice would be the FAA-developed GMS that has been provided to operators at a nominal cost since 1996. The costs associated with the GMS cover the logistics of positioning monitoring technicians to locations requested by the operators and data collection and processing charges.

The GMS consists of a portable measurement device and a data collection and processing system. The portable measurement device or GPS-based Monitoring Unit (GMU) includes a GPS receiver, a small computer, and power supply contained in a small case, plus two antennas that are temporarily affixed to the inside of the windows of the aircraft to be measured. The GMU records GPS position data throughout the flight of the aircraft. After the flight, the recorded data is processed and differentially corrected using data recorded at ground reference stations. This information is used to accurately determine the geometric height of the aircraft and is compared to the nearest flight level determined from meteorological data. Mode C height for the aircraft is obtained separately from radar recordings. The information is used to determine total vertical error, altimetry system error, and assigned altitude deviation.

The capital investment to develop the GMS was made during the implementation of NAT RVSM. To meet the monitoring goals for the North Atlantic RVSM implementation, GMU’s were built and

the infrastructure necessary to collect the data, to process the data, and to determine height-keeping performance was created. This infrastructure is managed by the FAA William J. Hughes Technical Center and consists of the resources required to operate the GMS. The GMS staff performs the following tasks:

- Schedules GMU usage
- Collects GPS data onboard or trains the operator to collect data
- Collects Mode C and meteorological data
- Processes the data
- Determines height-keeping errors
- Reports results

Since the primary goals of the NAT, PAC and WATRS monitoring programs will have been met, it is expected that the RVSM monitoring effort would take advantage of available GMS assets. Sufficient GMU's exist to complete the remaining NAT, PAC, and WATRS monitoring and to meet the monitoring goals of the domestic RVSM monitoring program.

As monitoring data is accumulated and acceptable in-service altitude-keeping performance is demonstrated, the FAA will continue to assess monitoring program goals. For the purpose of this analysis, however, it is assumed that the monitoring goals for individual operators used in oceanic RVSM programs will also

be applied in domestic airspace. It is also assumed that the GMS will be used by a percentage of operators, as it has been in oceanic RVSM monitoring programs. In domestic U.S. airspace, however, as the ground-based HMU monitoring program develops, the FAA will re-evaluate individual operator monitoring goals and the role of the GMS.

The FAA projects that 20% (1,237) of the 6183 aircraft to be monitored will choose to utilize the GMS. Monitoring costs for operators using the GMS for years 2002-2003 are estimated to be $3,000.00 per aircraft at a rate of 21 aircraft per month, arriving at a cost of $63,000.00 monthly. The monitoring costs for 2004 would increase to $186,000.00, as 62 aircraft would be monitored monthly. The RVSM monitoring goals assumed for this analysis can be summarized as follows:

- For operators with prior RVSM experience: 2 aircraft of each type are to be monitored.
- For operators with no prior RVSM experience: 3 aircraft of each type are to be monitored.
- For aircraft for which sufficient in-service data has not been collected, 60% of the aircraft are to be monitored.

Applying the monitoring goals to U.S. Domestic commercial aircraft fleets determined from traffic analysis yields the estimates contained in Table 4. The general aviation estimate

in Table 4 is the number of aircraft estimated to be upgraded for RVSM operations from Table 3.

Table 4. RVSM Monitoring Estimate				
Airline/Operator	Type/Series	Future Ops	Approved	Monitoring req.
Air Tran	B712	50	0	3
	B732	4	0	3
	DC9	34	0	21
Air Transport International	DC8	26	0	16
Air Wisconsin	CRJ2	9	0	6
Airborne Express	B762	28	0	3
	DC8	27	0	17
	DC9	74	0	45
Alaska Airlines	B732	8	0	5
	B734	40	0	3
	B737	18	0	3
	B739	11	0	3
	MD80	34	0	3
Allegiant Air, Inc.	DC9	4	0	3
Aloha Airlines	B737	2	2	0
	B732	19	3	0
America West	A320	11	0	3
	B732	0	0	0
	B733	47	0	3
	B752	13	0	3
American Airlines	A300	35	10	0
	B722	0	0	2
	B738	113	0	2
	B752	123	11	0
	B762	30	22	0
	B763	49	49	0
	B772	45	9	0
	DC10	0	10	0
	F100	75	0	45
	MD11	0	21	0
	MD80	264	0	2
	MD90	0	0	0
American Eagle	CRJ7	25	0	15
	E135	40	0	24
	E140	137	0	83
	E145	56	0	34
American Trans Air	B722	0	0	0
	B738	39	0	2
	B752	14	16	0
	B753	10	0	2
	L101	5	17	0
Amerijet International	B722	12	0	3

Table 4. RVSM Monitoring Estimate				
Arrow Airways, Inc.	L101	3	0	3
	DC8	11	0	7
Atlantic Coast	CRJ2	112	0	68
	J328	60	0	0
Atlantic Southeast	CRJ2	100	0	60
Atlas Air, Inc.	B744	12	12	0
	B743	3	2	0
	B742	23	23	0
Britt Airways (Continental Express)	E145	375	0	225
Capital Cargo International Airlines	B722	12	0	3
Casino Express Airlines	B732	5	0	3
Challenge Air Cargo, Inc.	DC10	3	0	3
Champion Air	B722	12	0	3
Chautauqua Airlines	E145	25	0	15
Comair	CRJ1	110	0	66
	CRJ7	20	0	12
Continental	B735	131	0	2
	B737	133	34	0
	B752	40	41	0
	B762	10	3	0
	B764	24	3	0
	B772	18	16	0
	DC10	0	36	0
	MD80	66	0	2
Custom Air Transport, Inc.	B722	4	0	3
Delta Airlines	B722	0	0	0
	B732	54	0	33
	B733	26	0	2
	B738	132	0	2
	B752	121	0	2
	B762	15	0	2
	B763	87	42	0
	B764	21	0	2
	B772	13	2	0
	L101	0	5	0
	MD11	15	15	0
	MD80	120	0	2
	MD90	16	0	10
DHL	A300	6	0	3
	B721	0	0	0
	B722	12	0	3
	DC8	7	0	5
Emery Worldwide	DC10	8	0	3
	DC8	13	0	8
Evergreen International Airlines	B747	2	2	0
	B742	4	4	0

Table 4. RVSM Monitoring Estimate				
	B741	6	5	0
	DC9	7	0	5
Express One International, Inc.	B728	1	0	1
	B723	1	0	1
	B722	27	0	3
Falcon Air Express	B722	4	0	3
Federal Express	A310	77	0	2
	B721	2	0	2
	B722	159	0	2
	DC10	94	22	0
	MD11	58	25	0
Fine Airlines, Inc.	L101	1	0	1
	DC8	12	0	8
Florida West Airlines	DC8	2	0	2
Frontier Airlines	A320	25	0	3
	B732	0	0	0
	B733	0	0	0
Gemini Air Cargo, LLC	MD11	3	3	0
	DC10	12	10	0
Gulf Air, Inc.	B722	6	0	3
Hawaiian Airlines	DC10	15	14	0
Horizon Air	CRJ7	30	0	18
	F100	0	0	0
Iowair	B732	2	0	2
Jetblue Airways Corp.	A320	40	0	3
Kitty Hawk	B722	36	0	3
LB Limited	B722	2	0	2
Legend Airlines, Inc.	DC9	7	0	5
Mesa Airlines	CRJ2	32	0	20
	E145	36	0	22
Miami Air International, Inc.	B722	8	0	3
Midway Airlines	B737	11	0	3
	CRJ	24	0	15
	F28	4	0	3
Midwest Express	DC9	16	0	10
	MD80	12	0	3
North American Airlines, Inc.	B738	2	0	2
	B752	3	3	0
Northern Air Cargo, Inc.	B722	2	0	2
Northwest Airlines	A320	92	0	2
	A330	22	0	2
	B722	0	0	0
	B744	50	47	0
	B752	73	0	2
	DC10	13	44	0
	DC9	156	0	94

Table 4. RVSM Monitoring Estimate				
Omni Air Express, Inc.	DC10	4	3	0
Pan American Airways Corp.	B722	7	0	3
Polar Air Cargo, Inc.	B742	8	8	0
	B744	3	3	0
	B741	12	10	0
Pro Air, Inc.	B734	3	0	3
Reliant Airlines, Inc.	DC9Q	3	0	2
Ross Aviation, Inc.	DC9	2	0	2
Ryan International	B721	5	0	2
	B722	13	0	2
	B732	2	0	2
	B734	3	0	2
	DC10	2	4	0
Sierra Pacific Airlines	B732	2	0	2
Skywest	CRJ1	11	0	7
	CRJ2	55	0	33
Southeast Airlines, Inc.	DC9	2	0	2
Southern Air, Inc.	B742	3	3	0
Southwest	B732	0	0	0
	B733	194	0	3
	B735	25	0	3
	B737	150	0	3
Spirit Airlines	DC9	8	0	5
	MD80	16	0	3
Sun Country	B722	12	0	3
	B738	6	0	3
	DC10	4	2	0
Sunworld International Airways, Inc.	B722	2	0	2
Tradewinds International Airlines	A30B	5	0	3
	L101	5	1	0
Trans World Express	E145	15	0	9
Transmeridian Airlines	B722	2	0	2
	A320	3	2	0
TWA	A320	50	0	2
	B712	50	0	2
	B752	36	26	0
	B762	16	12	0
	DC9	0	0	0
	MD80	68	0	2
United Airlines	A320	133	0	2
	B722	0	0	0
	B732	0	0	0
	B735	158	0	2
	B742	0	14	0
	B744	44	41	0
	B752	99	32	0

Table 4. RVSM Monitoring Estimate				
	B762	19	8	0
	B763	50	32	0
	B772	56	42	0
	DC10	0	20	0
UPS	A300	30	0	2
	B721	8	0	2
	B722	51	0	2
	B741	11	11	0
	B742	5	4	0
	B752	75	6	0
	B763	30	22	0
	DC8	49	0	30
USA Jet Airlines, Inc.	DC9	13	0	8
USAirways	A320	113	0	2
	A330	9	4	0
	B732	44	0	27
	B733	85	0	2
	B734	54	0	2
	B752	34	0	2
	B762	12	12	0
	DC9	0	0	0
	F100	40	0	24
	MD80	0	0	0
Vanguard Airlines	B732	14	0	9
World Airways, Inc.	DC10	5	4	0
	MD11	9	9	0
		6757	918	1384
General Aviation				4799
Total				6183

The FAA estimates that operators of 20% of the aircraft to be monitored will choose to utilize the GMS at a nominal charge of $3,000.00 per airframe. The cost to monitor the projected 1,237 airframes is **$3,711,000.00.*

The cost to complete the monitoring goals for U.S. domestic operators electing to utilize the GMS would be $3.7 million in 2001 dollars. The total monitoring and training costs between 2002 and 2004 would be $6.1 million ($5.1 million, discounted).

5. Air Traffic Control Costs

RVSM implementation in the NAT and PAC has shown that controller workload would decrease and controller training for RVSM could be accomplished during the existing training cycle. Implementing RVSM in U.S. domestic airspace will result in costs associated with system upgrades and air traffic controller training. The FAA projects these costs for U.S. Domestic RVSM to total $3.95 million and be evenly distributed among the years 2002-2003. This cost projection includes $1.25 million for the system upgrade and controller costs of $2.7 million, based on four hours of training for 7,500 controllers at a rate of $90.00 per hour.

Summary of RVSM Implementation Costs

The FAA projects that the airworthiness approval implementation costs for commercial carriers and general aviation aircraft would occur as follows:

- 20% of costs in year 2002
- 20% of costs in year 2003
- 60% of costs in year 2004

The FAA expects operators would incur flight crew training costs of $2.4 million for both general aviation and commercial operators in the year prior to implementation. The FAA estimates that the total cost would be $634.0 million or $539.9 million discounted (See Table 5).

Table 5. Implementation Costs							
	Commercial A/C Upgrade	GA A/C Upgrade	Total Upgrade	Training/ Monitoring/ TCAS v. 7.0/ATC	Total	Discount Rate Factor	Discounted Total
2002	$49,571,000.00	$66,091,220.00	$115,662,220.00	$11,837,200.00	$127,499,420.00	0.9346	119,160,958.00
2003	$49,571,000.00	$66,091,220.00	$115,662,220.00	$11,837,200.00	$127,499,420.00	0.8734	111,357,993.00
2004	$148,713,000.00	$198,273,660.00	$346,986,660.00	$32,009,600.00	$378,996,260.00	0.8163	309,374,647.00
Total	$247,855,000.00	$330,456,100.00	$578,311,100.00	$55,684,000.00	$633,995,100.00		539,893,598.00

B. Cost Savings and other Benefits

The FAA concludes that implementing RVSM would offer some operational benefits to operators without any reduction in aviation safety. A detailed discussion of how safety is maintained is shown in Appendix A. Estimated benefits, based on fuel savings for the commercial aircraft fleet over the years 2004 to 2018, would be $5.8 billion ($2.9 billion, discounted).

Fuel Savings

The greater availability of fuel-efficient altitudes and the utilization of efficient cruise climbs would yield fuel savings for commercial operators. To calculate the quantifiable benefits of improved fuel consumption, the NAS Advanced Concepts Branch, ACT-540, of the FAA Technical Center completed a study of RVSM benefits and estimated the daily fuel savings for all carriers in U.S. domestic airspace region to be 1.86%.[3] Total annual savings presented in Table 6 were determined by multiplying the product of the daily fuel savings, 1,496,451.61 gallons, and 365 days, by an estimated jet fuel price of $0.67 per

[3] FAA Technical Center NAS Advanced Concepts Branch (ACT-540) analysis of fuel savings for U.S. Domestic operator aircraft pairs resulting from RVSM implementation, July 2001.

gallon. In order to account for the proposed December 2004 implementation date, 17 days was used to calculate the savings for 2004. The FAA has no information to estimate cost savings for general aviation operations and invites comments. Fuel savings is estimated to increase 1.5% per annum in accordance with current forecasts provided by the FAA Statistics and Forecast Branch (APO-110).

Table 6. Fuel Savings			
2002	$ -	0.9346	$ -
2003	$ -	0.8734	$ -
2004	$ 17,044,584.00	0.8163	$ 13,913,458.00
2005	$ 371,446,600.00	0.7629	$ 283,374,833.00
2006	$ 377,018,299.00	0.7130	$ 268,808,836.00
2007	$ 382,673,573.00	0.6663	$ 254,991,560.00
2008	$ 388,413,677.00	0.6227	$ 241,884,517.00
2009	$ 394,239,882.00	0.5820	$ 229,451,201.00
2010	$ 400,153,480.00	0.5439	$ 217,656,980.00
2011	$ 406,155,783.00	0.5083	$ 206,469,005.00
2012	$ 412,248,119.00	0.4751	$ 195,856,112.00
2013	$ 418,431,841.00	0.4440	$ 185,788,742.00
2014	$ 424,708,319.00	0.4150	$ 176,238,853.00
2015	$ 431,078,943.00	0.3878	$ 167,179,846.00
2016	$ 437,545,128.00	0.3624	$ 158,586,490.00
2017	$ 444,108,304.00	0.3387	$ 150,434,848.00
2018	$ 450,769,929.00	0.3166	$ 142,702,216.00
Total	$ 5,756,036,461.00		$ 2,893,337,495.00

Other Benefits

In addition to fuel savings, many non-quantifiable or value-added benefits would result from the implementation of RVSM airspace in the U.S. and Gulf of Mexico. Air traffic managers, controllers, and operators have identified numerous additional benefits.

Through implementation of RVSM in the NAT and PAC regions, operators and controllers have realized some additional benefits, such as:

- Enhanced airspace capacity
- Reduced airspace complexity
- Decreased operational errors in these regions

- Reduction of user-requested off course climbs for altitude changes
- Improved flexibility for peak traffic demands
- More options in deviating aircraft during periods of adverse weather

The benefits outlined above for RVSM in the NAT and PAC regions are anticipated for RVSM in the U.S. and Gulf of Mexico. There should be expected efficiencies through reduced airspace complexity, the availability of six additional flight levels, and fewer altitude changes needed for crossing traffic.

Operators can expect enhanced operational efficiency and a potential reduction in departure delays due to improved airspace efficiency. Specific benefits cited by aircraft operators are:

- Decreased flight delays
- Improved access to desired flight levels
- Reduced average flight times
- Increased likelihood of receiving a clearance for weather deviations
- Seamless, transparent, and harmonious operations between other RVSM regions

- Consistent procedural environment throughout the entire flight
- Reduced impact of adverse weather by permitting aircraft deviations to other airways without any efficiency loss.

C. Analysis of Alternatives

This NPRM is a "significant regulatory action" as defined by Executive Order (E.O.) 12866 (Regulatory Planning and Review) because this NPRM would impose costs exceeding $100 million annually. The E.O. requires that promulgating economically significant rules provide an assessment of feasible alternatives to their respective rulemaking actions. In addition, the E.O. requires that an explanation of why the final rule, which is significant, is preferable to the identified potential alternatives. The FAA identified and considered three alternatives to the proposed rule.

Alternative One – The Status Quo

This alternative would maintain the 2,000-foot separation above FL 290 and would avoid the equipment and testing requirements of this NPRM, which impose a cost of $634.0 million ($539.9 million, discounted) between 2002 and 2004 on the aviation industry and the FAA. But

maintaining the status quo also means that aviation industry would not receive any of the cost-savings afforded by Domestic RVSM. As mentioned earlier, the cost-savings afforded by this NPRM are estimated to be $5.8 billion ($2.9 billion, discounted) in fuel savings over the same 15-year period. Since the foregone cost-savings of the alternative greatly exceed the avoided NPRM costs, the FAA rejects this alternative in favor of the proposed rule.

Alternative Two – Implement Domestic RVSM Without the Equipment and Testing Requirements

This alternative would allow RVSM between FL 290 and FL 410 without requiring aircraft system engineering to 14 CFR Part 91, Appendix G. This alternative would allow the aviation industry to receive the estimated $5.8 billion ($2.9 billion, discounted) in fuel savings while the aviation industry and the FAA avoids the NPRM costs of $634.0 million ($539.9 million, discounted). Unfortunately, this is not a viable alternative due to safety considerations.

Studies by the FAA and European civil aviation authorities have shown that many aircraft that have not been calibrated to the proposed RVSM standards exhibit altitude-keeping errors that exceed the standards established for RVSM safety. In these studies, non-RVSM

calibrated aircraft were observed with errors of up to 700 feet. Under RVSM aircraft are allowed to operate with only 1,000 feet vertical separation. If non-RVSM calibrated aircraft were allowed to operate with only 1,000 feet vertical separation, there could be a 400-foot altitude overlap in altitude-keeping errors for two non-RVSM calibrated aircraft operating in close proximity to each other. Thus, there is an increase risk of midair collisions if non-RVSM calibrated aircraft are allowed to operate under RVSM. Since there are some aviation safety concerns with this alternative, this alternative is also rejected in favor of the proposed rule.

Alternative Three – Delay Implementation of the RVSM by Seven or Eight Years

This alternative would delay implementation of the proposed rule by seven or eight years. This would allow the costs to be spread over a longer period of time so that costs in any one-year would be below $100 million. This would no longer make the proposed rule economically significant under E.O. 12866. The cost of this alternative would still be the same as the cost of the proposed rule, although the discounted costs would be lower than the discounted costs of the proposed rule. However, if implementation of the rule is delayed by seven or eight

years, the estimated cost-savings would be reduced by $2.0 billion or $2.4 billion, respectively ($1.5 billion, discounted or $1.8 billion, discounted, respectively). This is a considerable amount of cost-savings to forego in order for the FAA to avoid issuing an economically significant rule. For this reason, this alternative is rejected in favor of the proposed rule.

D. Conclusion

The FAA estimates that this proposed rule would cost U.S. operators $634.0 million for the period 2002-2004 ($539.9 million, discounted). Estimated benefits, based on fuel savings for the commercial aircraft fleet over the years 2004 to 2018, would be $5.8 billion ($2.9 billion, discounted). These benefits would be realized without a reduction in safety as discussed in the preamble.

IV. Initial Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 establishes as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and applicable statutes, to fit regulatory and informational requirements to the scale of the business, organizations, and governmental jurisdictions subject to regulation. To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals and to explain the rationale for their actions. The Act covers a wide-range of small entities including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will, the agency must prepare a regulatory flexibility analysis (RFA) as described in the Act.

However, if an agency determines that a proposed or final rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 Act provides that the head of the agency may so certify and an RFA is not required. The

certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

Operators that met the Small Business Administration (SBA) small entity criteria were parsed from the 6-day traffic sample of ETMS data and appear in Table 7. Revenue information for the small entity operators was obtained from the *Air Carrier Financial Statistics Quarterly, Dun and Bradstreet Million Dollar Directory, J&P Airline Fleets International, and the Department of Transportation Bureau of Transportation Statistics Office of Airline Information Web Site.*

TABLE 7. SUMMARY OF INITIAL RFA DETERMINATION OF ECNONOMIC IMPACT

	Air Carrier	Number of Employees	Annual Revenue	Annualized Cost of Compliance	Cost as a % of Annualized Revenue	Significant Economic Impact? Y/N
1	Air Transport International	622	$112,254,000.00	$537,664.06	0.48%	N
2	Amerijet International	708	$70,000,000.00	$231,609.13	0.33%	N
3	Arrow Airways, Inc.	1318	$85,000,000.00	$8,271.75	0.01%	N
4	Atlas Air, Inc.	973	$315,000,000.00	$0.00	0.00%	N
5	Challenge Air Cargo, Inc.	33	$110,000,000.00	$739.61	0.00%	N
6	Chautauqua Airlines	600	$73,000,000.00	$48,251.90	0.07%	N
7	Custom Air Transport, Inc.	80	$10,388,000.00	$77,203.04	0.74%	N
8	Express One International, Inc.	492	$19,100,000.00	$521,120.55	2.73%	Y
9	Florida West Airlines	55	$50,000,000.00	$41,358.77	0.08%	N
10	Gemini Air Cargo, LLC	591	$35,900,000.00	$493.11	0.00%	N
11	Kitty Hawk	796	$43,400,000.00	$694,827.40	1.60%	Y
12	Northern Air Cargo, Inc.	247	$42,600,000.00	$38,601.52	0.09%	N
13	Omni Air Express, Inc.	65	$10,000,000.00	$246.50	0.00%	N
14	Pan American Airways Corp.	550	$174,000,000.00	$135,105.33	0.08%	N
15	Polar Air Cargo, Inc.	765	$49,500,000.00	$12,875.92	0.03%	N
16	Pro Air, Inc.	284	$161,000,000.00	$5,790.23	0.00%	N
17	Reliant Airlines, Inc.	110	$25,000,000.00	$62,038.16	0.25%	N
18	Ross Aviation, Inc.	78	$16,300,000.00	$41,358.77	0.25%	N
19	Ryan International	1260	$67,400,000.00	$365,335.83	0.54%	N
20	Sierra Pacific Airlines	30	$9,100,000.00	$12,131.91	0.13%	N
21	Southern Air, Inc.	46	$52,400,000.00	$0.00	0.00%	N
22	Sun Country	1125	$207,000,000.00	$232,102.24	0.11%	N
23	Tradewinds International Airlines	177	$17,000,000.00	$11,029.01	0.06%	N
24	Vanguard Airlines	804	$68,500,000.00	$84,923.35	0.12%	N
25	World Airways, Inc.	950	$313,000,000.00	$246.50	0.00%	N

Source: U.S. DOT, Bureau of Transportation Statistics, Air Carrier Financial Statistics Quarterly for 2000 (4th Quarter December 2000/1999);US DOT, Bureau of Transportation Statistics Web Site; Dun and Bradstreet Million Dollar Directory, 1998; J&P Airline Fleets International, 2001

Only two small operators were found to have significant costs of compliance. This is not a substantial number of small entities that would be significantly affected by this proposed rulemaking. Therefore, the FAA certifies that this proposed rulemaking does not have a significant impact on a substantial number of small entities. The FAA requests comments from small operators affected by this rulemaking concerning the findings of this regulatory flexibility determination.

V. International Trade Impact Statement

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activity that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and where appropriate, that they be the basis for U.S. standards. The FAA has assessed the potential effect of this rulemaking and has determined that it would impose the same costs on domestic and international entities and thus has a neutral trade impact.

VI. Unfunded Mandates

The Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104-4 on March 22,1995, is intended, among other things, to curb the practice of imposing unfunded Federal mandates on State, local, and tribal governments.

Title II of the Act requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule, that may result in a $100 million or more expenditure (adjusted annually for inflation) in any one year by State, local,

and tribal governments in the aggregate, or by the private sector; such as a mandate is deemed to be a "significant regulatory action".

This proposed rule does contain a mandate that would impose over $100 million on private industry only. As explained in the alternative analysis of the RIA, delay in implementation of the rule or not implementing the rule would involve the industry foregoing fuel savings that greatly exceed the imposed cost of this rule. Implementing this rule without imposing the equipment requirements, which would eliminate the cost of this rule, would be unsafe. Therefore, of all of the alternatives examined in the RIA, the proposed rule would provide the greatest net benefit while maintaining aviation safety.